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Volta, the *Istituto Nazionale* and Scientific Communication in Early Nineteenth-Century Italy*

In a famous paper published in *Isis* in 1969, Maurice Crosland posed the question as to which was the first international scientific congress. Historians of science commonly established it as the Karlsruhe Congress of 1860 whose subject was chemical notation and atomic weights. Crosland suggested that the first international scientific congress could be considered the meeting convened in Paris on January 20, 1798 for the definition of the metric system.[1] In September 1798 there arrived in Paris Bugge from Denmark, van Swinden and Aeneae from Germany, Trallès from Switzerland, Ciscar and Pedrayes from Spain, Balbo, Mascheroni, Multedo, Franchini and Fabbroni from Italy. These scientists joined the several scientists already living in Paris and engaged in the definition of the metric system: Coulomb, Mechain, Delambre, Laplace, Legendre, Lagrange, etc. English and American scientists, however, did not take part in the meeting.

The same question could be asked regarding the first national congress in England, in Germany, in Switzerland, in Italy, etc. As far as Italy is concerned, many historians of science would date the first meeting of Italian scientists (Prima Riunione degli Scienziati Italiani) as the one held in Pisa in 1839.

This meeting was organised by Carlo Luciano Bonaparte, Napoleon's nephew, with the co-operation of the mathematician Gaetano Giorgini under the sanction of the Grand Duke of Tuscany Leopold II (Leopold was a member of the Royal Society).[2]

Participation in the meetings of the Italian scientists, held annually from 1839 for nine years, was high:

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[1] CROSLAND (1969).

[2] See PANCALDI (1983); BOTTAZZINI (1994); CECCHERINI (1939).

Year	Town	Participants
1839	Pisa	421
1840	Torino	573
1841	Firenze	888
1842	Padova	514
1843	Lucca	494
1844	Milano	1,159
1845	Napoli	1,611
1846	Genova	1,062
1847	Venezia	1,478

These meetings were attended by mathematicians, physicists, chemists, geologists, botanists, biologists, but scholars of human sciences were not included (historians, economists, men of letters or law).

The meetings were held in spite of the hostility shown by many sovereigns of the small states into which Italy was then divided. Pope Gregory XVI forbade the scientists of his state to take part in the meeting at Pisa, neither could they correspond with its participants. In 1846 scientists asked the new Pope, Pius IX, for his consent to hold the 1848 meeting in Bologna, but no answer was received. Consequently they decided to hold the meeting in Siena in 1848, once more asking the Pope for his permission to hold the meeting in Bologna in 1849. The revolutionary uprising in Italy and Europe in 1848 put an end to the meetings of Italian scientists.

Thus no meeting with Italian scientists was held in Bologna. Strangely enough, it was in Bologna in 1803 that the Italian scientists of the *Istituto Nazionale* created by Napoleon held their first conferences. Volta was the president. This unknown part in the history of scientific communication forms the basis of this paper.

In the spring of 1796 General Bonaparte crossed the Alps to fight the Austrian, Piedmontese and Papal troops allied against the French Republic. After a month, the Austrians and the Piedmontese were forced to surrender and Bonaparte conquered Milan. There he was joined by a commission charged to collect paintings, sculptures, books and scientific instruments for French museums. The mathematician Monge, the chemist Berthollet and the biologist Thouin, members of the First Class of the *Institut de France* were involved in this commission. Monge was actively engaged in Italy to promote the formation of democratic republics: the first Italian republic, the Cispadane Republic, formed in 1796 included Bologna, Ferrara, Modena and Reggio, and received its name from Monge himself.[3] The republics founded in Italy during the following years, the Cisalpine Republic (capital

[3] See MONGE (1796-98).

city Milan), the Ligurian Republic, the Roman Republic and the Neapolitan Republic adopted constitutions modelled on the French constitution of year III (1795). It was during this period that the *Istituto Nazionale* was established.[4]

In order to understand the advantages that the Italian scientists co-operating with the French expected from the Institute, something must be said about scientific communication in the eighteenth century. The lack of a political landmark, such as London for the British scientists or Paris for the French, meant that Italian scientists met only occasionally. A mathematician like Malfatti probably never even met Mascheroni and Paoli. Mathematicians used to correspond about their scientific discoveries and exchange papers which were often printed in scientific-literary journals.

Scientific-literary journals appeared in Italy as in France, England and Germany in the second half of the seventeenth century. The 'giornali dei letterati' which mainly included reviews of works and brief papers were published in many Italian cities. In Rome Nazari and Ciampini (1668-81) edited the *Giornale de' letterati* where excerpts from the *Journal des savans* and the *Philosophical Transactions* could also be found. In Parma and Modena Benedetto Bacchini published a *Giornale de' letterati*; the 1692 volume contained a paper by Leibniz which was the first work on differential calculus published in Italy. Although Italian mathematicians were behind in the study of pure mathematics (Descartes' geometry had still not been completely understood) the scientific journals in the seventeenth century were not very different from the European ones (*Journal des savans*, *Acta eruditorum*, etc.).[5]

At the same time Italy lacked a scientific-periodical publishing trade linked to the Academies like the *Philosophical Transaction* of the Royal Society or the *Histoire et mémoires de l'Académie des Sciences*. During the seventeenth century two of the first scientific academies of European stature were established in Italy: the *Accademia dei Lincei* in Rome and the *Accademia del Cimento* in Florence. Unfortunately these had a very short life since they relied completely on the benevolence of individuals (Federico Cesi for the *Lincei* and Leopoldo de' Medici for the *Cimento*). Consequently it was impossible for them to produce periodical scientific publications.[6]

In the eighteenth century the publication of mathematical papers in Italy revealed a significant development. On the one hand the literary journals were more alert to scientific discoveries, on the other, more stable academies and scientific societies were established.

The *Giornale de' letterati d'Italia* was published in Venice by Hertz from 1710 to 1740 and edited by Apostolo Zeno for several years. It included the best Italian

[4] See PEPE (1994); PEPE (1993).
[5] See DONATO and URBANI (1992).
[6] See CAPECCHI et al. (1992).

papers on differential calculus by Gabriele Manfredi (homogeneous differential equations of the first order), by Jacopo Riccati and by Giulio Carlo Fagnano (rectification of conic sections, lemniscate) as well as mathematical papers by Nicolaus Bernoulli, Jacob Hermann, Giuseppe Verzaglia and reviews of mathematical books.

Two other eighteenth-century journals published in Venice, the *Raccolta calogerà* (1728-57) and *Nuova raccolta* (1755-87), mainly collected erudite papers (archaeology, numismatics and epigraphy) although they also included short papers on pure and applied mathematics.

The *Nuovo giornale de' letterati* (Modena) was published by Girolamo Tiraboschi from 1773 to 1790 and contained reviews of mathematical books and some scientific articles.

The *Antologia romana* (1775-98) and the *Effemeridi letterarie* were edited in Rome by Giovanni Ludovico Bianconi and the mathematician Gioacchino Pessuti. Other *Giornali de' letterati* were published in the eighteenth century in Pisa, Florence, etc.

In the eighteenth century new academies were founded in Italy and published transactions in which importance was given to mathematics.

The *Accademia delle Scienze* founded in Bologna in 1690 was later reorganised within the *Istituto Marsigliano* in 1714 and published the *Commentarii* from 1731. The *Commentarii* collected many papers relevant to the history of mathematics (Boscovich, Vincenzo Riccati, Condorcet, etc.), but they were not regularly published (only seven volumes from 1731 to 1794). [7]

The *Accademia delle Scienze* in Turin, born as a private society in 1757 and recognised as a royal society in 1761, published five volumes of *Miscellanea Taurinensia* from 1759. Such volumes contained basic memoirs by Lagrange (about vibrating strings, the method of variations, etc.) and mathematical papers by d'Alembert, Euler, Monge, Laplace, Condorcet. In 1783 the royal society had changed into the *Accademia Reale delle Scienze* which, in 1786, started to publish its journal in French under the title of *Mémoires de l'Académie Royale des Sciences*.[8]

In Padua the *Accademia* was founded once more in 1779 and published transactions. In Siena, the *Accademia delle Scienze* also called *dei Fisiocritici*, published a first volume of proceedings in 1761, a second one in 1762 and the following volumes were published in 1767, 1771, 1775, 1781, 1794 respectively.

The *Accademia Reale* in Naples was founded in 1778 by Ferdinando IV and suppressed in 1787. It published one volume of proceedings.

In 1767 the Austrian Emperor, Joseph II, founded the *Reale Accademia di Scienze, Lettere ed Arti* in Mantua. It published one volume of proceedings in 1795.

[7] See TEGA (1986-87).
[8] See CARPANETTO et al. (1985-87).

The academies of Bologna and Turin limited their interests to physical, mathematical, natural sciences and medicine, whereas those of Naples and Padua admitted philological and philosophical disciplines following the Leibnizian model of the Berlin Academy. Initially these disciplines were also included by the private society of Turin.

In 1782 Antonio Maria Lorgna (1735-1796) founded the *Società Italiana* whose aim was to produce a periodical, *Memorie di matematica e fisica*, with regular issues. What this society had in common with the academies was the *numerus clausus* of its members (forty as in the *Académie Française*).[9] Unlike the academies, however, all Italian scientists could be members of the *Società Italiana*, regardless of their political opinions, for example, Alessandro Volta was nominated foreign member of the *Accademia delle Scienze* in Bologna. Like the academies of Bologna and Turin, the Italian Society only included studies on mathematics, astronomy, natural history, medicine, etc. The regular publication of the *Memorie di matematica e fisica della Società Italiana* was possible thanks to Lorgna's grants: every two years from 1782 to 1794 a volume of memoirs of about six or seven hundred pages was published. The mathematical contents of the memoirs were summarily examined and classified.[10] Under the presidency of Lorgna there was no distinction in sections between the mathematical memoirs (algebra, geometry, analysis, mathematical physics, mechanics, astronomy and hydraulics) and the physical memoirs (experimental physics, chemistry, anatomy, physiology, natural history and medicine). The *Memorie* were renowned all over Europe and Lorgna was probably the only Italian scientist to become a member of the most important European academies: *Académie des Sciences*, Royal Society, *Académie des Sciences et Belles Lettres* of Berlin, *Academia Scientiarum Imperialis* of St. Petersburg.[11] Publication of the memoirs was interrupted due to Lorgna's death (1796), but the new president Antonio Cagnoli, an astronomer who had lived in Paris for several years, guaranteed the *Società Italiana* financial support from the Napoleonic government. So the society was able to take up regular publication of the volumes of memoirs: vol. IX (1802), vol. X (1803), vol. XI (1804), vol. XII (1805), vol. XIII (1807), vol. XIV (1809), vol. XV (1811), vol. XVI (1813), vol. XVII (1816). Volumes XII-XVII were divided into two parts: the first including mathematical memoirs, the second one physical memoirs. Among the authors of mathematical memoirs published between 1799 and 1816 are to be found: Tommaso Valperga di Caluso (1737-1815), Giuseppe Cassella (1755-1808), Pietro Ferroni (1744-1825), Pietro Franchini (1768-1837), Vittorio Fossombroni (1754-1844), Francesco Pezzi (1764-1813), Giovanni

[9] PENSO (1978).
[10] See MARCOLONGO (1901); GRATTAN-GUINNESS (1986).
[11] PIVA (1993).

Plana (1781-1864), Pietro Paoli (1759-1839), Gianfrancesco Malfatti (1731-1807), Paolo Ruffini (1765-1822), Gioacchino Pessuti (1743-1814).[12]

One of Lorgna's aims was to make the discoveries of Italian scientists known abroad: he sent the *Memorie* to Paris, London and Berlin, etc.

As the *Società Italiana* was private, it lacked two important characteristics of the academies:

1. its members did not receive any grant,
2. they did not hold meetings.

In 1795, the *Institut National* of the French Republic was founded in Paris. Not only had the institute inherited the role of the old academies but it was also charged with the task of directing state education and of offering governmental advice.

The first *Istituto* to be organised in Italy was that of the Roman Republic to whose establishment Monge and Daunou were appointed in 1798. Among others, Pietro Franchini, Pio Fantoni and Daniele Francesconi became members of this institute for the mathematics and physics sections.

The creation of the *Istituto* in the Cisalpine Republic, the most important of the Italian republics, encountered many more difficulties. The formation of the institute was included in the general plan of state education presented at the Legislative Assembly (Gran Consiglio) by Lorenzo Mascheroni. The plan was discussed during the summer of 1798, but the discussion was suspended in September. Mascheroni left for Paris, where he represented the Cisalpine Republic at the Congress on the metric system and where he later died in 1800.[13]

The Austro-Russian army, during Bonaparte's stay in Egypt, began hostilities against the French and conquered Bologna and Milan in 1799. The Cisalpine, Roman and Neapolitan Republics came to an end, as did their institutes.

In 1800, after the battle of Marengo, Bonaparte, now First Consul, re-established the Cisalpine Republic which became the Italian Republic in 1802 and the Kingdom of Italy in 1805. In 1806 the Kingdom of Italy also included the region of Venice. Between February and August 1802 a commission including Pietro Moscati, Giovanni Paradisi, Luigi Castiglioni and Luigi Lamberti drew up both the law concerning state education (September 4, 1802) and the law dealing with the constitution of the *Istituto Nazionale* (August 17, 1802).[14]

The *Istituto Nazionale* was given the task of collecting and improving the sciences and arts and its advisory and executive powers in state education included taking part in the appointment of university professors.

[12] CAGNOLI (1812).
[13] BRAMBILLA (1973); PEPE (1994), pp. 65-8, 89-94.
[14] BORTOLOTTI (1915); MELZI D'ERIL (1958-66); PEPE (1992).

It is interesting to read the reasons for the creation of the *Istituto*:[15]

1. the declaration that different levels of science represent the measure of a nation's civilisation,
2. the need for a society formed by enlightened people who, by exchanging information with scientific colleagues, could collect, in one centre, new and old discoveries from either inside or outside the country. This society would contribute to bringing nations closer to each other,
3. the opportunity to establish Bologna as the centre, thus bringing the Bolognese people closer to the general interests of the Republic.

The *Istituto* was to be formed by thirty members receiving a salary and thirty honorary members: half of the salaried members were to be chosen from among the professors of the Bologna and Pavia universities.

Francesco Melzi d'Eril, vice-president of the Italian Republic, sent his suggestions for the nomination of members of the *Istituto* to Napoleon, who chose the first thirty members on October 5, 1802.[16] The nominated members had to produce a list containing double the number of available seats for members. From this list Napoleon picked the remaining thirty members on April 6, 1803.[17] In reference to Melzi's proposals there were some changes: Domenico Cocoli and Giuseppe Venturoli were not included, while Giambattista Guglielmini and Vincenzo Brunacci were included. Mathematicians formed the highest number (twenty-two out of sixty), Bonaparte and Melzi were members of the *Istituto*, as well as important politicians such as Pietro Moscati, Giovanni Paradisi, Vincenzo Dandolo and Giambattista Venturi, all of whom were academically and scientifically entitled to be members. Napoleon chose important state personalities from among scientists: Paradisi was president of the Senate and General Director of Public Works, Moscati was a member of the Directory and General Director of Scientific Education, Dandolo was Governor in Dalmatia, Venturi was Ambassador in Switzerland.

Once the nominations in the *Istituto* had been completed, the Home Secretary Vismara, summoned the first meeting, on May 24, 1803, in the building of the old *Istituto Marsigliano* in Bologna. In this first meeting it was impossible to reach a quorum. Subsequent meetings were held in the same place on May 28, 30, 31, and June 1.

The recently found minutes of these meetings, still unknown to the few scholars of the *Istituto Nazionale*, have enabled me to retrace what can be considered the first meeting of Italian scientists.[18] Alessandro Volta was elected president of the meeting,

[15] Archivio antico dell'Università di Padova, ms. 773.
[16] MELZI D'ERIL (1958-66), II, pp. 451-61, and III, pp. 24-31.
[17] *Ibid.*, IV, pp. 254-5.
[18] *Seduta de' membri dell'Istituto Nazionale del giorno 24 maggio 1803*, Archivio di Stato di Milano, Studi parte moderna b. 262.

Carlo Amoretti and Luigi Brugnatelli were elected secretaries. During the sessions the regulations of the *Istituto* were discussed. In the session of May 30, it was decided that the *Istituto* should be divided into three sections: the section of Physical and Mathematical Sciences with thirty members, the section of Political and Moral Sciences with thirteen members and the section of Literature and Fine Arts with fourteen members. The mathematicians were in the first section: Oriani, Gregorio Fontana, Saladini, Cassiani, Canterzani, Fantoni, Bonati, Mari, Delanges, Brunacci, De Cesaris, Mariano Fontana, Guglielmini, Piazzi, Ruffini and Araldi. Other mathematicians were also included in the section of Political and Moral Sciences (Cagnoli, Paradisi, Venturi) and in the section of Literature and Fine Arts (Stratico, Venini). Alberto Fortis was elected secretary of the *Istituto* and Giuseppe Avanzini became vice-secretary. It was decided that the activities of the *Istituto* were to be performed in Milan under the direction of Pietro Moscati, and in Bologna under Sebastiano Canterzani. All members living in Bologna had to meet once or twice a month to produce the yearly calendar of sessions. A new extraordinary meeting of the *Istituto* was held in Bologna, in October 1803, in order to discuss the regulation of the *Istituto* under Moscati's presidency. The regulation was published in January 1804[19] and, soon after, it was necessary to elect a secretary due to Forti's death. Michele Araldi, already professor of anatomy and medicine at Modena University, and scholar of physical and mathematical sciences as well as a distinguished literary man, was chosen.[20] The following general meeting was held in Bologna on July 2, 1804, Simone Stratico was the president on that occasion. At this meeting:[21]

1. the secretary produced a detailed summary of the activities of the *Istituto*,
2. the memoirs of the *Istituto* were studied in detail,
3. special commissions for particular problems were nominated,
4. it was decided to present problems in the different sections, offering prizes for the best solutions,
5. the lists of candidates for the vacant places were compiled.

The meetings in Bologna were almost always held to the limit of the quorum because of the scarce participation of the Lombard members, who never accepted Bologna as the centre of the *Istituto*. The Lombard party, taking advantage of the celebration for the founding of the Italian Kingdom in the autumn spring of 1805, had the centre of the *Istituto* transferred to Milan, as voted by the majority of members. The change was prevented by Napoleon, who, in June 1805, confirmed Bologna as the centre of the institute. Here the last general meeting of the *Istituto*

[19] ISTITUTO REALE ITALIANO DI SCIENZE, LETTERE E ARTI (1812).
[20] See ROVIDA (1817).
[21] *Transunto del processo Verbale di cadauna delle sessioni tenutesi dall'Istituto Nazionale nella sua generale convocazione del 1804, a. III*, Archivio di Stato di Milano, Studi parte moderna b. 262.

was held in July 1805. The disagreement between the Lombard and Bolognese members put an end to the general meetings.[22]

In spite of this situation the *Istituto* managed to increase its publications considerably: four volumes in the section of Physics and Mathematics were published (two in 1806, one in 1808 and one at the beginning of 1811) and two volumes in the other sections (1809 and 1813). Altogether 2,836 pages were published. Michele Araldi, secretary of the *Istituto*, edited these volumes, contributed several papers and wrote prefaces to some of the volumes. Two of these are particularly remarkable: in one he claims that the Italian language should replace Latin in scientific writings (1813). The other preface is a paper in which he criticised the historical report offered to the Emperor by French scientists in 1808,[23] as far as Italian sciences are concerned. Araldi pointed out Italian scientists' contribution to contemporary scientific progress: he reported the results of Volta, Lagrange, Ruffini, Paoli, Brunacci, Avanzini, etc.

The volumes of mathematics and physics include many important papers. The astronomer Barnaba Oriani, famous for his studies on the orbit of Uranus, recently discovered by Herschel, published a treatise on mathematical geodesy which was divided into three parts.[24] Here Oriani studied elliptic trigonometry. Paolo Ruffini published a paper on his contribution to the question of algebraic solvability of equations, that is by radicals.[25] In the domain of mathematical analysis there are remarkable papers: Brunacci studied "Legendre's conditions" for functional integrals in the calculus of variations for the existence of a minimum or a maximum.[26] Girolamo Saladini solved a problem in mechanics and analysis that had been discussed for many years. He demonstrated that Bernoulli's lemniscate, Cassini's ovals and the curves with isochronal properties all belonged to the same class of algebraic curves.[27] Paradisi produced an interesting paper on the vibration of elastic plates taking Chladni's experiments into consideration; the plates were covered with dust and under the effect of sound some lines appeared through the dust which were then mathematically studied. Worthy of note are the contributions to mechanics (Avanzini, Araldi, Fontana, Saladini, Delanges) to hydraulics (Brunacci, Avanzini, Stratico) and to astronomy (Piazzi and Cagnoli).

The history of science deserves separate consideration. In addition to Araldi's preface on Italian contemporary science, another three important papers dealt with

[22] BORTOLOTTI (1915), pp. 19-21.
[23] *Rapports à l'Empereur sur le progrès des sciences, des lettres et des arts depuis 1789*, Préface de Denis Woronoff, Paris: Belin, 1989, 5 vols.
[24] ORIANI (1786).
[25] See CASSINET (1988).
[26] TODHUNTER (1861), pp. 233-40.
[27] BONATI (1992), pp. 189-225.

the history of mathematics and physics.[28] It is interesting to notice the uncertainty with which these papers were placed: Fontana's paper on Maurolico's arithmetic was included in volumes of physics and mathematics, while the two papers by Giambattista Venturi on Greek and Roman optics and on Heron's *On the Dioptra* were published in a volume of moral sciences and literature. Venturi's papers are among the most important of the whole collection. They include the study of two unedited works from Greek science: Ptolemy's *Optics* and Heron's *On the Dioptra*.

Other papers on physics (meteorology, optics, etc.) were published by Volta, Aldini and Araldi. In addition to these, further papers introduced new scientific instruments.

In 1808 Napoleon himself intervened on the order of the *Istituto* in a letter to Viceroy Eugène. Napoleon was against changing the centre from Bologna to Milan where there would not have been a sufficient number of highly qualified scholars. He suggested organising the *Istituto* into several autonomous academies in Pavia, Bologna, Venice and Padua: "En France tout est à Paris: en Italie, tout n'est pas à Milan: Bologne, Pavie, Padoue, peut-etre Venise, ont leurs lumières à eux".[29]

On December 25, 1810, following Napoleon's suggestions, the *Istituto* was changed into *Istituto Reale di Scienze, Lettere e Arti*, with its centre in Milan and sections in Venice, Bologna, Padua and Verona. The authority which was concerned with state education no longer belonged to this new *Istituto*. The number of salaried members was raised to sixty, while there was no limitation as to the number of honorary members. In Milan a general meeting of the salaried members was to be held every two years for the presentation of works by the sections. The new regulation was approved on March 28, 1812. Two classes were established:

1. Science and Mechanical Arts,
2. Literature and Liberal Arts.

The ratio of the members of these sections was to be 3:2. All members had the right to vote in scientific discussions. The *Istituto* also had to include foreign members. A president was to head the Institute and a director was to chair each class. The first president was Giovanni Paradisi. The languages that could be used for the Institute's publications were Italian and Latin, or French for foreign members only.

Within the classes the following division into subjects was established:[30]

CLASS OF SCIENCES AND MECHANICAL ARTS:
Division I: Geometry, Calculus, Theoretical Mechanics, Astronomy, Geography,
Division II: Natural History, Experimental Physics, Chemistry, Medicine, Surgery, Agriculture,

[28] BORGATO (1992).
[29] BORTOLOTTI (1915), p. 59.
[30] ISTITUTO REALE ITALIANO DI SCIENZE, LETTERE E ARTI (1812), pp. 52-70, 79-86.

Division III: Mechanical Arts;

CLASS OF LETTERS AND LIBERAL ARTS:
Division I: Law, Morals, Ideology, Political Economy, Diplomatics,
Division II: History, Literary History, Archaeology, Philology, Poetry,
Division III: Drawing Arts, Music.

The Milanese section of the *Istituto Reale* met regularly in 1812, 1813 and 1814 and the meetings were not even interrupted by the return of the Austrians. They preserved the institute and even kept Giovanni Scopoli as the General Director of state education. The sections of Padua and Venice began their meetings in 1814.[31]

I would like to point out the main merits of the *Istituto Reale* as far as scientific communication in Italy is concerned:

1. for the first time Italian scientists from different regions had to come together regularly and discuss scientific and organisational problems,
2. regular correspondence kept members in touch with one another, since they were required to produce reports on books, scientific discoveries, or declare their opinions on the election of members,
3. the *Istituto* promoted international scientific co-operation in spite of political divisions. For example Giovanni Aldini, the brother of Antonio, an eminent Italian minister in Paris, went to England in order to spread the theories of Galvanism, and later reported on his experience in England at a meeting of the *Istituto*.

The activity of the *Istituto Reale* was continued by the *Istituto Lombardo* where there were important personalities, like Carlo Cattaneo, who contributed to the unification of Italy. The *Istituto Veneto* was founded in Venice only some decades later and the *Accademia delle Scienze* in Bologna was not re-founded until 1815 because many of its members had been involved in the Napoleonic government. The law that created the *Istituto Reale* included the formation of the *Atenei Civici* whose duty it was to organise cultural activities in many cities. The *Atenei* were an important point of reference for nineteenth-century culture (Venice, Bergamo, etc.).

The high number of scientists in the *Istituto* was an indication of the development that scientific culture had undergone in the Napoleonic period. Even the reform of state education (1802) led to a considerable increase in scientific disciplines due to the creation of the lyceum. Within the universities there was, for the first time, a faculty of mathematics and physics established especially for the purpose of producing engineers and architects. A special "corps" formed by engineers of "ponts et chausses" was created in 1806 and it totalled nearly 100

[31] ANON. (1812-13); ANON. (1812-13a); ANON. (1814-15).

members; it was presided over by personalities of the *Istituto* such as Paradisi, Stratico and Brunacci.[32]

The military school of Modena played an important role in the preparation of technicians as well as of cadets. In this school some members of the *Istituto*, such as Cagnoli and Ruffini, were teachers, and the school produced scientists such as Carlo Sereni and Pietro Paleocapa.

It must be remembered that the Kingdom of Italy included Lombardy (the wealthiest and most highly populated region in Italy) as well as the Venetian region, Emilia (not including Parma and Piacenza), Romagna and part of the Marche region. Piedmont, Tuscany and Latium were included in the French Empire and had to submit to the same French laws for state education.[33] Scientists like Cuvier and Prony frequently came to Italy in order to inspect the universities or to give advice on public works.

On the other hand, the Turinese Lagrange and the Tuscan Fossombroni were members of the French Senate. In the Napoleonic period the universities of Pisa, Pavia and Turin became very important and it was here that most of Italian mathematical research in the nineteenth century was concentrated.

From the late eighteenth century to the early nineteenth century the first journals specialising in a single discipline (physics and chemistry) were published; Luigi Brugnatelli, a member of the *Istituto*, was their editor. The titles of these journals are:

Biblioteca fisica d'Europa, 1788-1791,
Giornale fisico-medico, 1792-1795,
Annali di chimica, 1790-1802,
Giornale di fisica, chimica, storia naturale, 1808-1827.

A specialised and autonomous journal was not founded in the domain of mathematics: the first one was to be the *Annali di matematica* edited by Barnaba Tortolini (1850).

Thanks to the high number of mathematicians in the *Istituto* and the *Società Italiana* it was possible to publish an equal amount of mathematical and scientific papers.

After the unification of Italy national culture had to be reorganised, so scientists such as Francesco Brioschi and Quintino Sella promoted the formation of national academies (the *Accademia dei Lincei* was re-founded in 1875 according to this plan).[34]

The regionalism that had played such a negative role in the creation of the Napoleonic *Istituto* continued to make itself felt and the history of Italian mathematics developed in connection with several centres: Pisa, Pavia, Turin and

[32] PEPE (1994a).
[33] See BOUDARD (1988).
[34] See PUCCI (1986).

later also Bologna, Naples, Palermo and Rome. This pluralism did not, however, jeopardise the existence of a national community of scientists with the authority to decide who was to be nominated in the academies or who was to become a full professor in the universities.[35]

The difficult life of the Napoleonic *Istituto* had not been spent in vain.

[35] BARBIERI and PEPE (1992).

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